

### AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claim 1 (Currently Amended): A method of determining *in vivo* metabolism of one or more sugars or fatty acids in an individual, said method comprising:

(a) administering one or more  $^2\text{H}$ -labeled sugars or  $^2\text{H}$ -labeled fatty acids to an individual for a sufficient time for said one or more  $^2\text{H}$ -labeled sugars or  $^2\text{H}$ -labeled fatty acids to produce  $^2\text{H}$ -labeled water;

(b) obtaining one or more bodily tissues or fluids at one or more times from said individual, wherein said one or more bodily tissues or fluids comprise said  $^2\text{H}$ -labeled water; and

(c) detecting an abundance of one or more mass isotopomers of said  $^2\text{H}$ -labeled water;  
~~and  $^2\text{H}$  produced from said one or more  $^2\text{H}$ -labeled sugars or  $^2\text{H}$ -labeled fatty acids in water to determine the metabolism of said one or more sugars or fatty acids in said individual.~~

(d) applying combinatorial analysis to determine the metabolism of said one or more sugars or fatty acids in said individual, based on said abundance of one or more mass isotopomers of said  $^2\text{H}$ -labeled water.

Claim 2 (Previously Presented): The method according to claim 1, wherein said one or more sugars comprise  $^2\text{H}$ -labeled glucose.

Claim 3 (Previously Presented): The method according to claim 2, wherein said  $^2\text{H}$ -labeled glucose is selected from the group consisting of  $[6,6\text{-}^2\text{H}_2]\text{glucose}$ ,  $[1\text{-}^2\text{H}_1]\text{glucose}$ , and  $[1,2,3,4,5,6\text{-}^2\text{H}_7]\text{glucose}$ .

Claim 4 (Currently Amended): The method according to claim 1, wherein said one or more ~~compositions~~  $^2\text{H}$ -labeled sugars or  $^2\text{H}$ -labeled fatty acids are administered by a technique selected

from the group consisting of oral, gavage, intraperitoneal, intravascular, and subcutaneous administration.

Claim 5 (Currently Amended): The method according to claim 4, wherein said one or more ~~compositions~~  $^2\text{H}$ -labeled sugars or  $^2\text{H}$ -labeled fatty acids are administered orally.

Claim 6 (Original): The method according to claim 1, wherein said individual is a mammal.

Claim 7 (Previously Presented): The method according to claim 6, wherein said mammal is selected from the group consisting of humans, rodents, primates, hamsters, guinea pigs, dogs, and pigs.

Claim 8 (Original): The method according to claim 7, wherein said mammal is a human.

Claim 9 (Previously Presented): The method according to claim 1, wherein said one or more bodily tissues or fluids are selected from the group consisting of blood, urine, saliva, and tears.

Claim 10 (Previously Presented): The method of claim 1, wherein said one or more bodily tissues or fluids are selected from the group consisting of liver, muscle, adipose, intestine, brain, and pancreas.

Claim 11 (Currently Amended): The method of claim 1, comprising the additional step of partially purifying said  $^2\text{H}$ -labeled water.

Claim 12 (Currently Amended): The method of claim 11, comprising the additional step of isolating said  $^2\text{H}$ -labeled water.

Claim 13 (Currently Amended): The method according to claim 1, comprising the additional step of ~~measuring~~ detecting  $^2\text{H}$  incorporation or a ratio of  $^2\text{H}$  incorporation into one or more chemical compositions selected from the group consisting of glucose, glycogen, glycerol-triglyceride, triglyceride fatty acid, proteins, and DNA.

Claim 14 (Original): The method according to claim 13, wherein said chemical composition is glucose.

Claim 15 (Original): The method according to claim 14, comprising the additional step of measuring endogenous glucose production.

Claim 16 (Previously Presented): The method according to claim 14, comprising the additional step of measuring a proportion of labeled glucose stored in tissue glycogen relative to said  $^2\text{H}$ -labeled sugar administered.

Claim 17 (Previously Presented): The method according to claim 14, comprising the additional step of measuring a proportion or rate of administered  $^2\text{H}$ -glucose undergoing glycolysis.

Claim 18 (Original): The method according to claim 13, wherein said chemical composition is glycogen.

Claim 19 (Original): The method according to claim 13, wherein said chemical composition is glycerol-triglyceride.

Claim 20 (Original): The method according to claim 19, comprising the additional step of calculating new triglyceride synthesis.

Claim 21 (Original): The method according to claim 13, wherein said chemical composition is triglyceride fatty acid.

Claim 22 (Original): The method according to claim 21, comprising the additional step of calculating new fatty acid synthesis.

Claim 23 (Previously Presented): The method according to claim 13, comprising the additional step of calculating a proportion or storage rate of labeled fatty acids stored in tissue relative to  $^2\text{H}$ -labeled fatty acid administered.

Claim 24 (Previously Presented): The method according to claim 1, comprising the additional step of calculating a proportion or storage rate of administered  $^2\text{H}$ -labeled fatty acids undergoing fatty acid oxidation.

Claim 25 (Original): The method according to claim 13, wherein said chemical composition is a protein.

Claim 26 (Original): The method according to claim 13, wherein said chemical composition is DNA.

Claim 27 (Currently Amended): The method according to claim [[24]] 26, comprising the additional step of calculating a rate or amount of DNA synthesis.

Claim 28 (Currently Amended): The method according to claim 1, further comprising calculating a rate or total amount of incorporation of said  $^2\text{H}$  into said  $^2\text{H}$ -labeled water.

Claim 29 (Previously Presented): The method according to claim 13, further comprising calculating a rate or amount of incorporation of  $^2\text{H}$  into said one or more chemical compositions.

Claim 30 (Canceled).

Claim 31 (Currently Amended): The method according to claim 1, wherein said  $^2\text{H}$ -labeled water is detected by methods selected from the group consisting of gas chromatography/mass spectrometry, liquid chromatography-mass spectrometry, gas chromatography-pyrolysis-isotope ratio/mass spectrometry, gas chromatography-combustion-isotope ratio/mass spectrometry, cycloidal mass spectrometry, Fourier-transform-isotope ratio (IR)-spectroscopy, near IR laser spectroscopy, and isotope ratio mass spectrometry.

Claim 32 (Previously Presented): The method according to claim 1, wherein said detecting step is accomplished by detecting one part  $^2\text{H}$  in  $10^7$  parts water.

Claim 33 (Canceled).

Claim 34 (Previously Presented): The method according to claim 1, wherein said determining of said metabolism is used as a surrogate marker for FDA approval of drugs.

Claim 35 (Previously Presented): The method according to claim 1, wherein said determining of said metabolism is used for clinical management of patients.

Claim 36 (Canceled).

Claim 37 (Previously Presented): The method according to claim 1, wherein said determining of said metabolism further comprises identifying individuals at risk for insulin resistance and diabetes mellitus.

Claim 38 (Previously Presented): The method according to claim 1, wherein said determining of said metabolism further comprises diagnosing high-fat diet-induced obesity.

Claim 39 (Previously Presented): The method according to claim 1, wherein said determining of said metabolism further comprises identifying individuals at risk for high-fat diet-induced obesity.

Claim 40 (Previously Presented): The method according to claim 1, wherein said determining of said metabolism further comprises the step of monitoring the effects of interventions to prevent or reverse insulin resistance, diabetes mellitus and high-fat diet-induced obesity.

Claim 41 (Previously Presented): The method according to claim 1, further comprising the steps selected from the group consisting of diagnosing and treating wasting disorders.

Claim 42 (Previously Presented): The method according to claim 1, further comprising the steps selected from the group consisting of diagnosing and treating hypoglycemia.

Claim 43 (Previously Presented): The method according to claim 1, further comprising the steps selected from the group consisting of diagnosing and treating glycogen storage disease.

Claims 44-66 (Canceled).

Claim 67 (New): The method according to claim 1, wherein the combinatorial analysis is mass isotopomer distribution analysis (MIDA).